

Patent claims

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FIG

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1. Method for determination of the stress on a turbine machine  
(1) with turbine blades (4) arranged on a rotor shaft (3)  
5 mounted to rotate within a housing (2), whereby through means  
(5,8) to generate at least one electromagnetic wave at least  
one electromagnetic wave (31) is emitted in a turbine channel  
(6) in an area of the turbine blades (4) which at least partly  
reflects the at least one electromagnetic wave (31) from at  
10 least one turbine blade (4), the reflected part (32) of the at  
least one electromagnetic wave is received by receiving means  
(7, 8) and from a signal corresponding to the at least one  
electromagnetic wave received the stress on the turbine blades  
(4) is determined.

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2. Method for determination of the stress on a turbine machine  
(1) with guide vanes (11) arranged for fixed rotation within a  
housing (2), whereby through means (5,8) to generate at least  
one electromagnetic wave at least one electromagnetic wave  
20 (31) is emitted in a turbine channel (6) in an area of the  
guide vanes (11) which at least partly reflects the at least  
one electromagnetic wave (31) from at least one guide vane  
(11), the reflected part (32) of the at least one  
electromagnetic wave is received by receiving means (7, 8) and  
25 from a signal corresponding to the at least one  
electromagnetic wave received the stress on the guide vanes  
(11) is determined.

3. Method in accordance with claim 1 and 2, characterized in  
30 that, on the rotor shaft (3) of the turbine machine (1)  
provided with turbine blades (4) and guide vanes (11) both the  
stress on the turbine blades (4) and also the stress on the  
guide vanes (11) is determined.

4. Method in accordance with one of the claims 1 to 3, characterized in that the surface quality of the blades is determined as a measure for the stress.

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5. Method in accordance with claim 4, characterized in that, in accordance with a surface structure to be determined, at least one electromagnetic wave (31) matched to the relevant surface form with a matched wavelength is used.

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6. Method in accordance with one of the claims 1 to 5, characterized in that the means (8) for generating at least one electromagnetic wave is used for receiving at least one electromagnetic wave (32).

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7. Method in accordance with one of the claims 4 to 6, characterized in that the surface quality of the blades is determined from an intensity of the at least one received electromagnetic wave (32).

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8. Method in accordance with one of the claims 1 to 3, characterized in that the vibration status of the blades is determined as a measure for the stress.

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9. Method in accordance with claim 8, characterized in that at least one electromagnetic wave (31) matched to the relevant surface form is used with a matched wavelength.

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10. Method in accordance with claim 1 to 9, characterized in that at least one radar wave (31) is used as at least one electromagnetic wave.

11. Method in accordance with one of the claims 8 to 10,

characterized in that the means (8) for generating at least one electromagnetic wave is used for receiving at least one electromagnetic wave (32).

5 12. Method in accordance with one of the claims 8 to 11, characterized in that the vibration status of the blades is determined from a frequency comparison between the at least one emitted and the at least one received electromagnetic wave (32).

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13. Method in accordance with one of the previous claims, characterized in that the surface quality and the vibration status are simultaneously determined as a measure for the stress.

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14. Device for executing the method in accordance with one of the previous claims with means (9) for generating an electrical vibration, means (5, 8) for generating at least one electromagnetic wave (31) from the vibration, means 8) for  
20 receiving at least one electromagnetic wave (32) and with an evaluation unit (10) for evaluation of the at least one receivable electromagnetic wave (32).

15. Device in accordance with claim 14, characterized in that  
25 the means (8) for generating at least one electromagnetic wave is suitable both for sending and for receiving at least one electromagnetic wave (31, 32).

16. Device in accordance with claim 14 or 15, characterized in  
30 that the means (5, 8) for generating at least one electromagnetic wave (31) is a radar antenna.

17. Device in accordance with one of the claims 14 to 16,

characterized in that the means (5, 8) for generating at least one electromagnetic wave (31) is arranged in the turbine channel (6) of the turbine machine (1), especially of a gas turbine.